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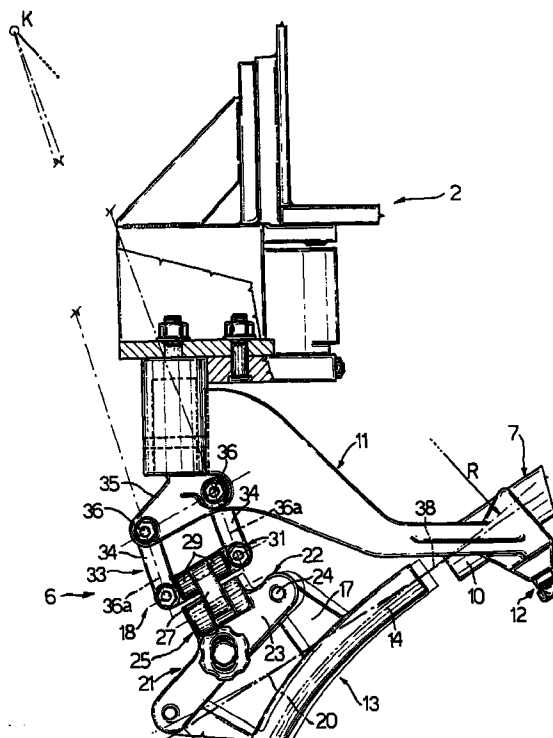
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(54) **A supply unit for conveying gobs of glass to a mould of a machine for forming glass articles**

(57) A delivery unit (6) for conveying gobs of glass to a mould (13) of a machine (1) for forming glass articles has an inclined guide channel (7) which receive the gobs of glass from a gob distributor (5), a deflector (13) which directs the gobs of glass in transit along the channel (7) towards the associated mould (3), and an adjustable support device (18) for connecting the deflector (13) to a fixed structure (2) of the machine (1); the support device (18) being able to rotate the deflector (13) with respect to the channel (7) about a virtual axis (20) substantially coincident with the axis (8) of the channel (7) itself and move the deflector (13) itself towards and away from the channel along a substantially rectilinear path (38).

Fig.3



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Description

[0001] The present invention concerns a supply unit for conveying gobs of glass to a mould of a machine for forming glass articles.

[0002] In the glass industry, in order to manufacture glass articles it is known to utilise forming machines including a plurality of aligned forming moulds, and a supply unit which supplies a succession of gobs of glass to each supply. The supply unit includes a gob distributor and, for each forming mould, an associated delivery unit which receives the gobs of glass from the distributor and conveys them to the associated mould. The known delivery units usually include an inclined channel which receives the gobs from the distributor, a deflector interposed between the output of the channel and the associated mould, and an adjustable device which supports the deflector, which device enables the adjustment of the position of the deflector with respect to the associated channel and the associated device.

[0003] In most of the applications, each support device includes first and second hinged link assemblies which enable the relative rotation of the deflector with respect to the channel about two axes, one of which is vertical and the other orthogonal to the axis of the associated channel itself.

[0004] The known support devices of the type described above, although widely used, are unsatisfactory in that, especially following the adjustment of the position of the deflector about the vertical axis, the portion of the advancement path of the gobs that extends into the channel-deflector interface zone exhibits sharp variations in direction. As a result of these sharp variations, the gobs collide violently with the walls of the deflector and become deformed in unpredictable manner and, in some cases, become separated from the inner surface of the deflector such as to follow an undefined path, either along the deflector, or into the associated mould. The deformation of the gobs and the impossibility of guiding them along certain predetermined paths gives rise to a continuous, unpredictable and undesirable variation in the quality of the finished product.

[0005] The object of the invention is to manufacture a delivery unit which enables the problems described above to be overcome simply and economically.

[0006] According to the present invention there is realised a delivery unit for conveying gobs of glass to a mould of a machine for forming glass articles, the unit including an inclined guide channel having a rectilinear axis and which receives the gobs of glass from a gob distributor, a deflector which directs the glass gobs in transit along the channel towards the associated mould, and adjustable support means which connect the said deflector to a fixed structure of the machine, the said adjustable support means including first support means which enable the deflector to rotate with respect to the said channel about at least one axis, characterised in

that the said axis is a virtual axis substantially parallel to the axis of the said channel.

[0007] The invention will now be described with reference to the accompanying drawings, which illustrate a non-limitative embodiment, in which:

Figure 1 schematically illustrates, with parts removed for clarity, a machine for forming glass articles provided with a preferred embodiment of a gob delivery unit manufactured according to the present invention;

Figure 2 illustrates, partially and on an enlarged scale, the gob delivery unit of Figure 1;

Figure 3 is similar to Figure 2 and illustrates, on a reduced scale and with parts removed for clarity, the gob delivery unit of Figure 2; and

Figures 4 and 5 are sections on an enlarged scale taken, respectively, on the line IV-IV and on the line V-V of Figure 2.

[0008] In Figure 1, the reference numeral 1 generally indicates a machine for the production of glass articles including a fixed frame 2, a plurality of aligned moulds 3 disposed close to each other, and a supply unit 4 for advancing a succession of gobs of glass, not shown, towards each of the moulds 3. The unit 4 includes a gob distributor 5, known and not described in detail and, for each mould 3, a gob delivery unit 6 interposed between the distributor 5 and the associated mould 3 for guiding the gobs along a predetermined path in advance.

[0009] With reference to Figures 1 and 2, the delivery units 6, only two of which are visible in Figure 1, include respective inclined upper channels 7, which have respective rectilinear axes 8 extending fan-like from the distributor 5 and forming, together with a horizontal plane, respective angles, the values of which depend, as is known, on the axial position of the associated mould 3 and which, in any case, differ from each other by several degrees, generally not by more than 5-6 degrees. Each channel 7 has an associated inlet portion 9 hinged in known manner to the frame 2, and an associated outlet portion 10 supported by an associated bracket 11 which is firmly connected to the frame 2, and with which is associated a device 12, known and not described in detail, for adjusting the angular position of the associated channel 7.

[0010] Still with reference to Figures 1 and 2, each delivery unit 6 further includes a known curved deflector 13 which receives the gobs of glass from the associated channel 7 and guides them into the associated mould 3. In particular, each deflector 13 has an inlet portion 14 located close to the outlet portion 10 of the associated channel 7 and not coupled to the portion 10 itself, and an outlet portion 15 coupled to the frame 2 by means of an adjustable positioning device 16 which enables, in use, the portion 15 to be brought to and kept exactly in correspondence with an inlet aperture of the associated mould 3.

[0011] Each deflector 13 has a pair of attachment bosses or projections 17, and is coupled to the associated bracket 11 by an adjustable support device indicated 18 which, during the operation of the positioning device 16, enables the adjustment of the position of the single deflector 13 with respect to the mould 3. In particular, each device 18 enables the associated deflector 13 to rotate about a respective virtual axis 20 (Figures 2 and 3) which lies in a plane of symmetry P1 of the associated deflector 13, is substantially aligned with the axis 8 of the associated channel 7, and forms, with the above-mentioned horizontal plane, an angle the value of which is substantially equal to the median value of the angles of inclination of the channels 7. Under these conditions, the angles of inclination of the virtual axes 20 differ slightly from the angles of inclination of the corresponding channels 7 by a relatively small amount, usually not greater than 2-3 degrees, so that each virtual axis 20 can be considered as practically coincident with the axis 8 of the associated channel 7. Alternatively, in an embodiment that is not shown, each virtual axis 20 forms, together with the aforesaid horizontal plane, an angle that is exactly equal to the angle of inclination of the corresponding channel 7.

[0012] As shown in more detail in Figures 2 to 4, each device 18 includes a rapid exchange unit 21, in itself known, an L-shape bracket 22 of which has a first plate-like portion 23 connected to the projections 17 by pins 24 orthogonal to the axis 20, and a fork-like portion 25 extending orthogonally to the portion 23 and the axis 20. The ends of a pair of facing connecting rods 27 are hinged to the portion 25 by means of pins 26 parallel to the axis 20 (Figure 4 and Figure 5), the opposite ends of which rods are hinged, by means of pins 28 parallel to the pins 26, to counterposed brackets 29 located on opposite sides of a cross-piece 30 to define, together with the brackets 29, a cross 31. The connecting rods 27 define, together with a part of the cross 31 and the fork-like portion 25, an articulated quadrilateral structure 32. As shown, in particular in Figure 4, the connecting rods 27 are the same as each other and have respective axes 27a which lie in a plane orthogonal to the axis 20, which is indicated P2 in Figure 2, and converge towards each other and towards the related deflector 13 to intersect at a point on the axis 20. However, as shown in Figure 5, because of space requirements, the connecting rods 27 are moved laterally in an asymmetric manner with respect to the plane P1, and have dimensions and inclinations so as to form a link that is geometrically and functionally similar to that described above.

[0013] Still with reference to Figures 2 to 4, the cross-piece 30 of the cross 31 forms part of a second articulated quadrilateral structure 33 which, in turn, includes two further connecting rods 34 dimensionally the same as each other, each having an end portion hinged to an associated end of the cross-piece 30 and an opposite end portion hinged to a projection 35 of the associated

bracket 11 by means of parallel pins 36 orthogonal to the axis 20. The connecting rods 34 have associated axes 36a which lie on a plane orthogonal to the plane P2 and, in the particular example described, converge towards each other and towards the associated projections 35, and intersect at a point K to form an angle substantially equal to 2.7 degrees.

[0014] In use, and considering for simplicity of explanation a single delivery unit 6, during the adjustment of the position of the deflector 13, for example, following a mould change, the structure 32 rotates the deflector 13 about the associated virtual axis 20 and, therefore, moves the output portion 15 of the deflector 13 in a direction substantially parallel to that of alignment of the moulds 3. Given the particular position of the virtual axis 20, during the aforesaid adjustment, the input portion 14 of the deflector 13 rotates practically about the axis 8 of the associated channel 7, remaining in a position aligned with the channel 7 itself; since localised variations or sharp deviations of the path of the gobs are never generated in the channel-deflector passage zone, on leaving the channel 7, these gobs, differently from the known arrangements, do not substantially change their motion and continue, instead, along their path of advance, staying in contact with the inner surface of the deflector 13 and practically conserving the initial geometric and dimensional characteristics.

[0015] On the other hand, in use, the structure 33 enables, the deflector to move with respect to the channel along a path 38 that, in the particular example described, is defined by an arc of a circle having its centre point K and a radius R, the value of which depends on the relative inclination of the connecting rods 36a. In the particular example described, the connecting rods 36a together form a relatively small angle, corresponding to a very large radius R and, in particular, of the order of 1.8 metres. In these conditions, it is clear that the arc extending in to the channel-deflector passage zone, that is, along which the portion 14 of the deflector 13 moves, can reasonably be approximated with a line which coincides substantially with the axis 8 of the channel 7 and, as said above, substantially with the axis 20, and constitutes substantially a continuation of the axis 8 itself.

[0016] On the other hand, the input portion 14 of the deflector 13 would move along a rectilinear path in the event that two connecting rods 38 were located parallel to each other. It has been established experimentally that, since this disposition of the connecting rods 36a enables the input portion 14 of the deflector 13 to move in parallel manner, this movement is thus subordinate to the application of relatively high movements which, in some cases, deform the deflector 13 which distorts the adjustment of the deflector 13 itself. These movements are, on the other hand, significantly less where the connecting rods 36a converge slightly towards each other as in the example described, in which the relative angle of inclination of the connecting rods 34 and, therefore,

the radius R achieves the double aim of easily moving the deflector 13 along a practically rectilinear path, and, at the same time, avoiding appreciable deformations of the deflector 13 itself. In any case, the structure 33 enables the input portion 14 of the deflector 13 to move towards and away from the output portion 10 of the channel 7 without giving rise to an appreciable relative rotation of the input portion 14 of the deflector 13 with respect to the output portion 10 of the channel so that, even following this adjustment, the original path of the gobs does not have any sharp variations in direction in order to vary the position of the output portion 15 of the deflector 13.

[0017] However, it is clear from the above that the support device 18 described for the purpose of understanding two common articulated parallelogram common structures lying in respective orthogonal planes is not only extremely simple from the constructional point of view, but is without doubt functionally efficient and reliable and involves extremely limited manufacturing costs.

[0018] Finally, it is clear from the above that modifications and variations may be introduced to the groups 6 described which do not depart from the ambit of protection of the present invention.

[0019] In particular, each support device 18 can be coupled directly to the frame 2, or to a bracket different from the support bracket of the associated channel.

[0020] Furthermore, the two structures 32 and 33 could be manufactured in a different way from that described by way for example; not only this, but the structure 33 could be replaced by respective guide and slider devices provided with motorised operating units.

Claims

1. A delivery unit (6) for conveying gobs of glass to a mould (3) of a machine (1) for forming glass articles, the unit (6) including an inclined guide channel (7) with a rectilinear axis (8), and which receives the glass gobs from a gob distributor (5), a deflector (13) which directs the gobs of glass in transit along the channel (7) towards the associated mould (3), and adjustable support means (18) which connect the said deflector (13) to a fixed structure (2) of the machine (1), the said adjustable support means (18) including first support means (32) which enable the deflector (13) to rotate with respect to the said channel (7) about at least one axis (20), characterised in that the said axis (20) is a virtual axis substantially parallel to the axis (8) of the said channel (7).
2. A unit according to Claim 1, characterised in that the said virtual axis (20) is substantially aligned with the axis (8) of the said channel (7).
3. A unit according to Claim 1 or Claim 2, characterised in that the said adjustable support means (18) further include second support means (13) which enable an inlet portion (14) of the said deflector (13) to move along a substantially rectilinear path (38).
4. A unit according to Claim 3, characterised in that the said path (38) is substantially parallel to the axis (8) of the said channel (7).
5. A unit according to Claim 4, characterised in that the said path (38) is substantially coincident with the said virtual axis (20).
6. A unit according to any preceding claim, characterised in that the said first support means include a first articulated parallelogram structure (32).
7. A unit according to Claim 6, characterised in that the said first articulated parallelogram structure (32) includes first (25) and second (29) parallel cross-pieces coupled to the said deflector (13) and the said fixed structure (2) respectively, and a pair of first connecting rods (27) hinged to the cross-pieces (25) (29) to rotate about respective axes (26) parallel to the said virtual axis (20); the said first connecting rods (27) having respective axes (27a) converging towards each other and towards the said first cross-piece (25); the said axes (27a) lying in a plane (P2) orthogonal to the said virtual axis (20) and intersecting at a point on the virtual axis (20) itself.
8. A unit according to Claim 7, characterised in that the said first connecting rods (27a) are equal in length.
9. A unit according to Claim 7, characterised in that the said first connecting rods (27a) are different in length.
10. A unit according to Claims from 7 to 9, characterised in that the said adjustable support means (18) include attachment means (23) for attachment to the said deflector (13); the said attachment means (23) being firmly connected to the said first cross piece (25).
11. A unit according to Claim 3 and Claim 7, characterised in that the said second support means include a second articulated parallelogram structure (33) interposed between the said fixed structure (2) and the said first articulated parallelogram structure (32).
12. A unit according to Claim 11, characterised in that the said second articulated parallelogram structure (33) includes first (35) and second (30) cross-pieces coupled to the said fixed structure (2) and to the said first parallelogram structure (32) respec-

tively, and a pair of second connecting rods (34) hinged to the said cross-pieces (30) (35) to rotate about respective axes (36) orthogonal to the said virtual axis (20).

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13. A unit according to Claim 12, characterised in that the said second connecting rods (36) converge towards each other and towards the associated said first cross-piece (35).

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14. A unit according to any of claims from 9 to 13, characterised in that the second cross pieces (29) (39) of the said first (32) and second (33) parallelogram structures form part of a cross member (31) common to both parallelogram structures.

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15. A unit according to any of claims from 9 to 14, characterised in that it includes a bracket (11) which supports the channel (7) firmly connected to the said fixed structure (2); the first cross-piece (35) of the said second articulated parallelogram structure (33) being firmly connected to the said bracket (11).

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16. A unit (4) for supplying gobs to a plurality of moulds (3) of a machine (1) for forming glass articles including, for each said mould (3), a delivery unit (6) according to Claim 1, the axes (8) of the said channels (7) forming, together with a horizontal plane, respective angles that are different from each other, characterised in that the virtual axis (20) of each of the said deflectors (13) forms, together with the said horizontal plane, an angle substantially equal to the median value of the angles of inclination of the said channels (7).

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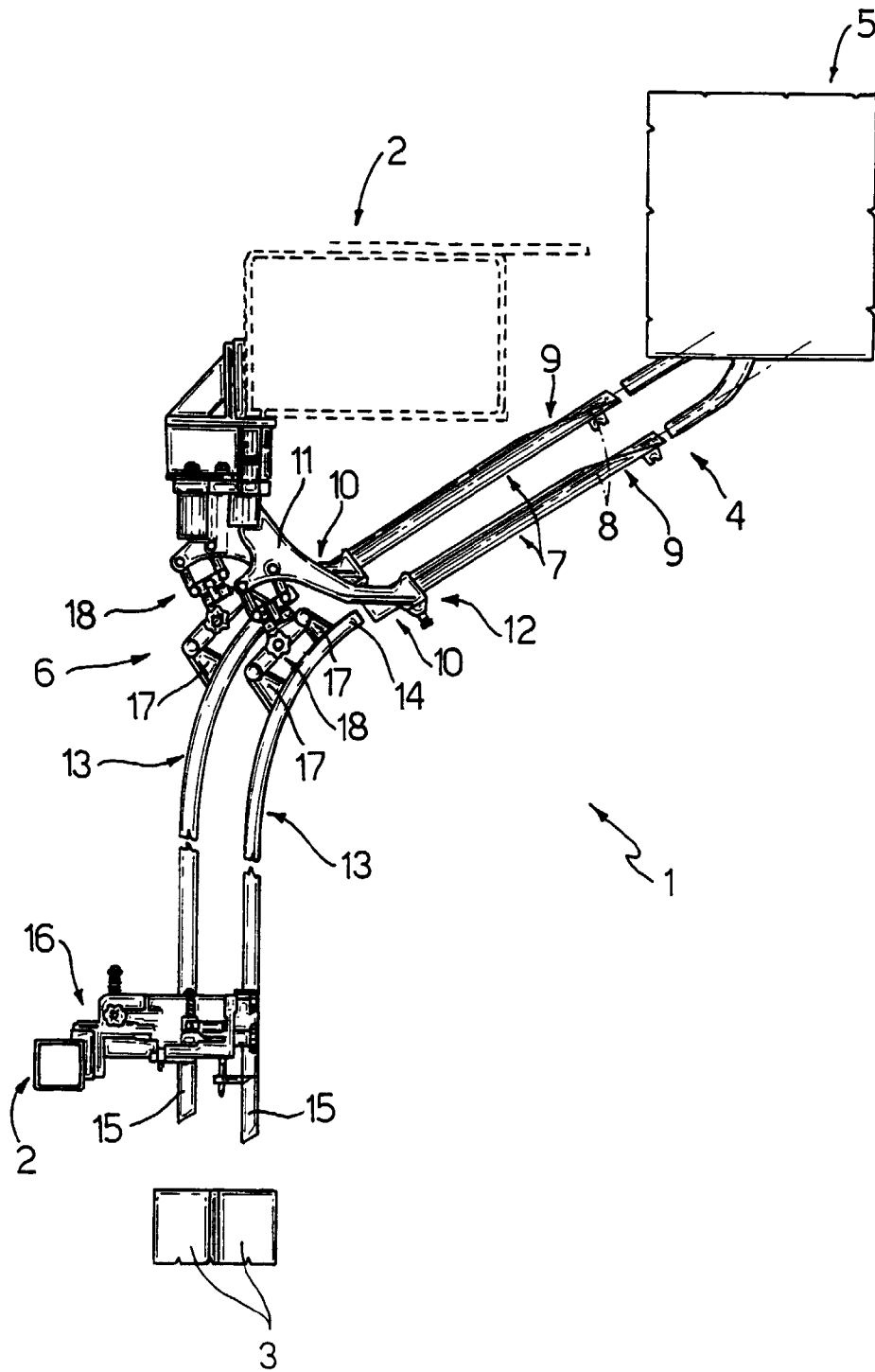
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Fig.1



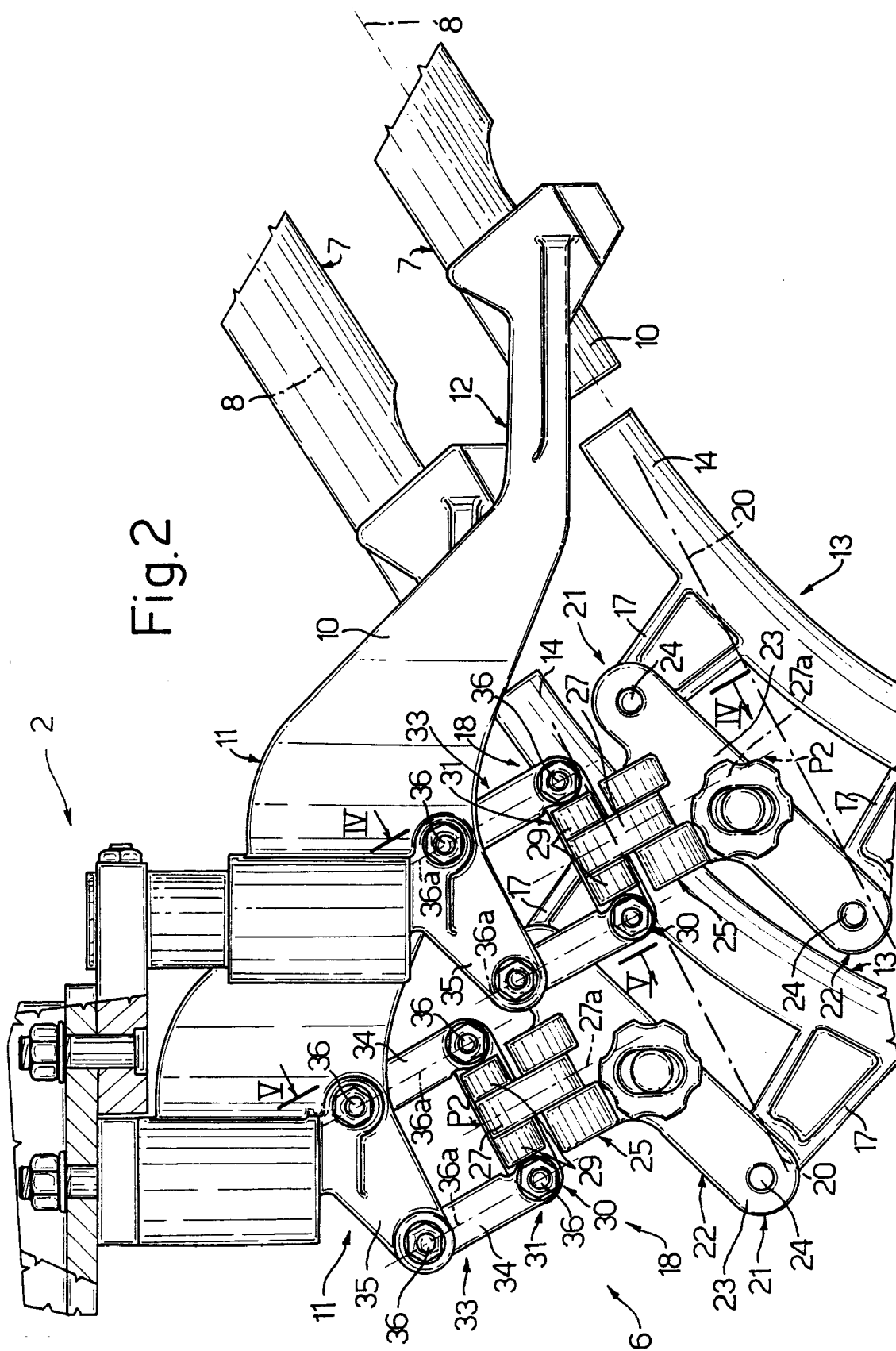
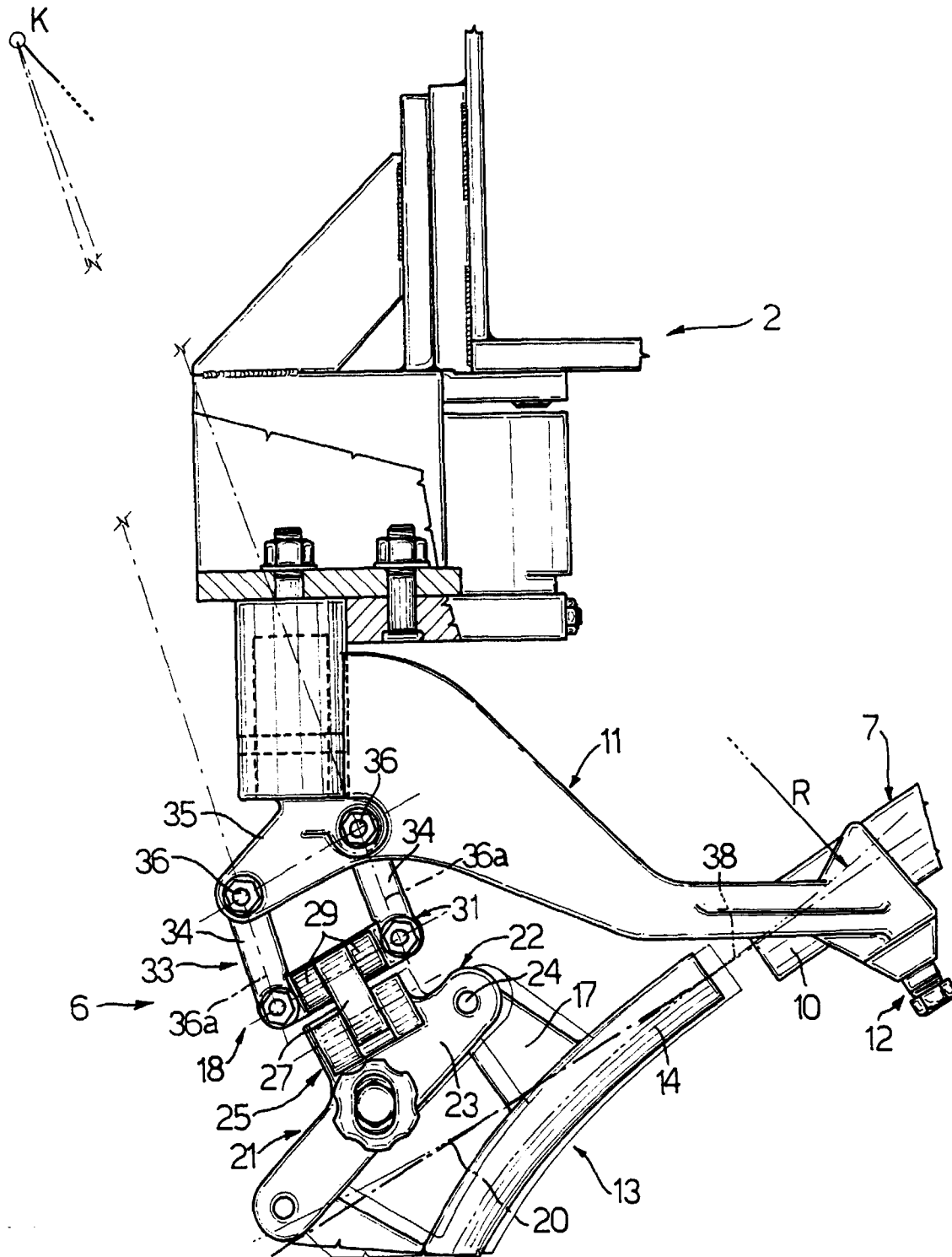


Fig.3



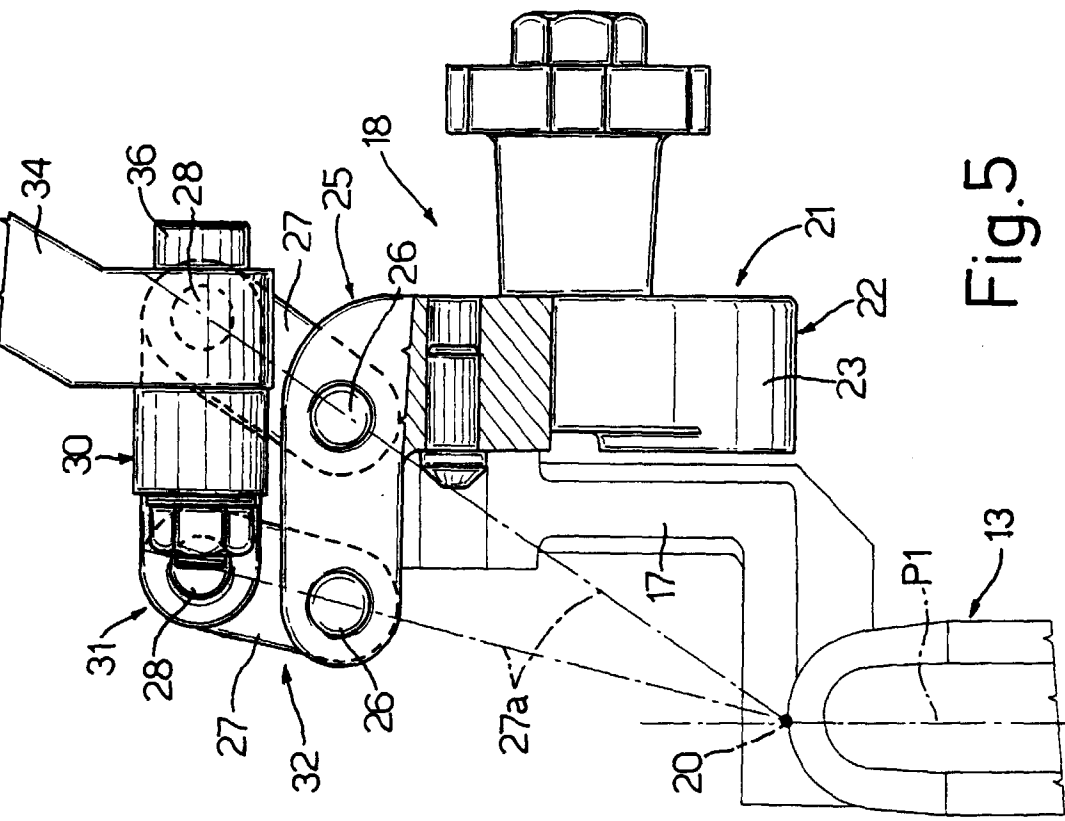


Fig.5

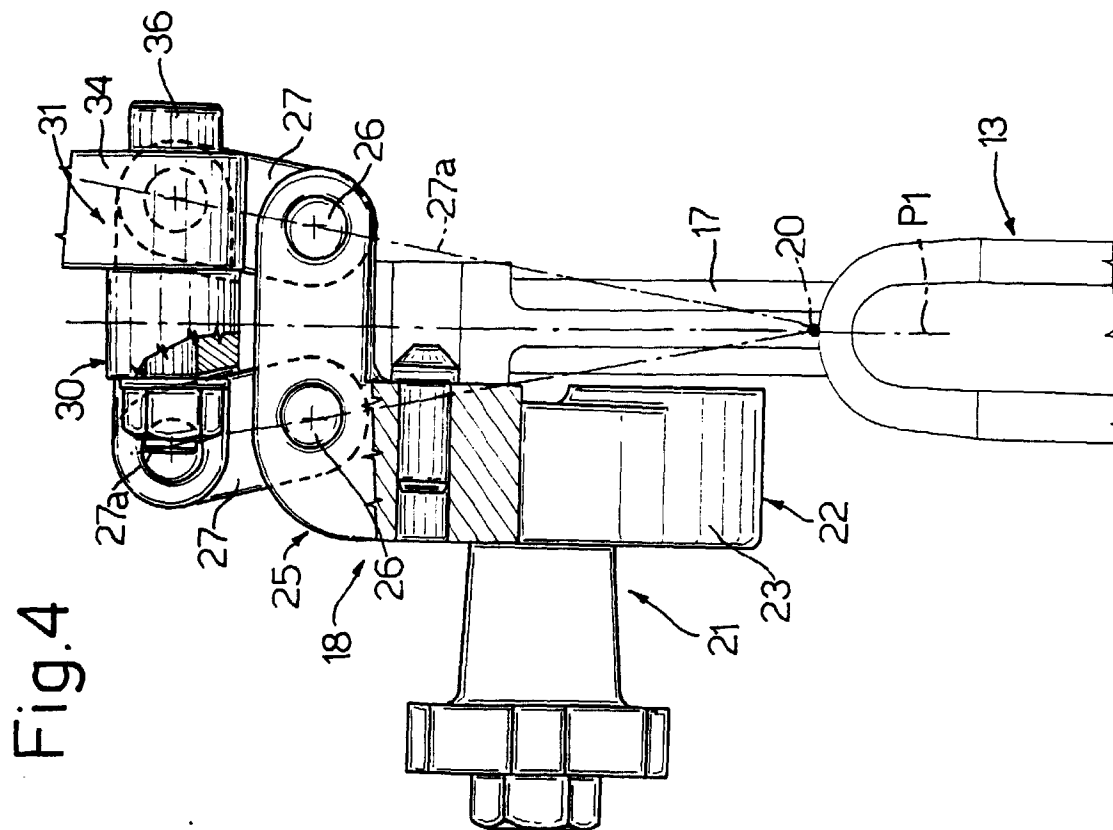


Fig.4



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EUROPEAN SEARCH REPORT

Application Number
EP 98 12 4746

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.6)
A	DE 195 01 762 A (GPS GLASPRODUKTIONS-SERVICE GMBH) 25 July 1996 * the whole document *	1	C03B7/16
A	EP 0 118 293 A (EMHART INDUSTRIES, INC.) 12 September 1984 * the whole document *	1	
A	EP 0 658 518 A (EMHART GLASS MACHINERY INVESTMENTS INC.) 21 June 1995 * the whole document *	1	
A	EP 0 480 642 A (VHC LIMITED) 15 April 1992 * the whole document *	1	
A	EP 0 564 090 A (EMHART GLASS MACHINERY INVESTMENTS INC.) 6 October 1993 * the whole document *	1	
The present search report has been drawn up for all claims			TECHNICAL FIELDS SEARCHED (Int.Cl.6)
			C03B
Place of search	Date of completion of the search	Examiner	
THE HAGUE	19 April 1999	Van den Bossche, W	
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**ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.**

EP 98 12 4746

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report. The members are as contained in the European Patent Office EDP file on
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19-04-1999

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
DE 19501762 A	25-07-1996	DE 59600806 D	17-12-1998
		WO 9622253 A	25-07-1996
		EP 0804388 A	05-11-1997
		JP 10512230 T	24-11-1998
		US 5888267 A	30-03-1999
EP 118293 A	12-09-1984	AU 2692284 A	28-09-1984
		JP 60500809 T	30-05-1985
		WO 8403494 A	13-09-1984
		US 4566894 A	28-01-1986
EP 658518 A	21-06-1995	AU 677730 B	01-05-1997
		AU 8044594 A	22-06-1995
		JP 8059253 A	05-03-1996
		US 5549727 A	27-08-1996
EP 480642 A	15-04-1992	GB 2249089 A	29-04-1992
		AU 645612 B	20-01-1994
		AU 8575291 A	30-04-1992
		CA 2053077 A	11-04-1992
		DE 69105452 D	12-01-1995
		DE 69105452 T	14-06-1995
		ES 2064049 T	16-01-1995
		JP 7089736 A	04-04-1995
		US 5213602 A	25-05-1993
		US 5254150 A	19-10-1993
EP 564090 A	06-10-1993	AU 3545493 A	30-09-1993
		DE 69304582 D	17-10-1996
		DE 69304582 T	06-02-1997
		ES 2094476 T	16-01-1997
		JP 6009227 A	18-01-1994
		US 5298049 A	29-03-1994